

Self-Etching Environmentally Acceptable Primers Testing

Background:

Standard Air Force and industry practice uses a specific process to apply organic coatings (paint) to aluminum substrates. The order of this process is:

- 1) Clean
- 2) Rinse
- 3) Acid Deoxidize
- 4) Rinse
- 5) Chrome conversion coat (CCC)
- 6) Rinse
- 7) Apply primer
- 8) Apply topcoat.

Although the chrome conversion coat is considered an essential step in the process for its effectiveness in corrosion prevention, it has potentially adverse health effects and contributes to pollution. Significant effort is being devoted to finding other materials and processes providing the corrosion protection of CCCs without the associated hazard and pollution potential.

Recently, the coatings industry has developed a class of materials called “self-etch” primers, a combination of the technology employed by “wash primers” and the standard primers used by the Air Force. These materials are intended to combine the acid deoxidation and chromate protection functions of the CCC with the adhesion promotion properties of a primer coating.

The use of a “wash primer” coating to provide the acid deoxidation and chromate protection function is a well established technology. In wash primer technology, a phosphoric acid component is mixed with a resinous component (typically polyvinyl butyral) containing chromates and other extender pigments. The acid component reacts with surface oxides, forming phosphates typical of an acid deoxidation process. A thin coating is applied to a freshly cleaned surface as short-term protection from corrosion. The painting process is completed by the application of a standard primer and topcoat.

Project Sponsor/Customer: Air Force wide
Period of Performance: Jun 00 – Jan 02

Objective:

This project evaluates self-etching environmentally acceptable (EA) primers for possible replacement of chromate conversion coating (CCC) surface treatment. The project compares self-etching EA primers to current CCCs and other available surface treatments. The performance of these self-etching EA primers is evaluated against the existing MIL-P-23377 specification. The test matrix includes testing to appraise the ease of application, determine dry times, adhesion properties, and fluid resistance. The evaluation of the primers includes corrosion inhibition qualities as part of a complete system. A goal of this Project is to field test the best performer on B-1B aircraft parts.

The objective of this project is to identify and evaluate commercially available environmentally acceptable primers or primer systems providing corrosion protection to aluminum substrates that are not prepared for application sufficiently or where pollution prevention standards preclude the use of a chromate conversion coating. A secondary objective will be to compare the performance of these systems with conventional systems to determine if this technology offers broader opportunities for pollution prevention for typical painting operations by elimination of the waste associated with CCC processes.

Key activities include the identification and coordination with potential users of the technology, identification of commercial candidate materials, preliminary screening of candidates, downselect of screened materials, and more thorough testing of the selected materials.

Status:

Product offerings from aerospace coatings companies as well as several non-traditional sources were evaluated and products/technologies were selected for phase 1 testing. Materials for phase 1 testing were ordered and received. Testing has begun and candidates will be downselected for further testing. Phase 2 testing will be conducted during the first six months of 2001.

Project Plan: Approved Sep 00

Test Plan: First of 2 approved.

Final Report: Planned completion Jan 02

As of Date: Feb 01